OPERANT BEHAVIOUR AND PHYSIOTHERAPY: ESTABLISHING WALKING BEHAVIOUR IN A MODERATELY RETARDED INSTITUTIONALIZED BOY[1]

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The present study sets out the design of an operant conditioning programme which it was decided was the most appropriate form of physiotherapy for the patient, a moderately retarded institutionalized boy.

The problem was concerned with eliminating crawling, walking in the wrong direction and walking too slowly.

This behaviour was particularly disruptive on the daily journey from the boy's ward to his hospital school.

Crawling as a method of locomotion occurs normally in young children. Later, it is substituted with walking. In a study of profoundly retarded children, O'Brien, Azrin and Bugle (1972) put forward a theoretical analysis of why normal children stop crawling and begin to walk while others do not. They suggest that movement through space (locomotion) can be considered a class of different response modes, each obtaining identical reinforcement. Walking and crawling are two alternative response modes of this class.

Normal children with the requisite learning capacity, coordination and muscular development soon learn to walk. Retarded children learn more slowly, and, in addition to their intellectual handicap, often have others such as physical deformities, spasticity or incoordination. Therefore, walking remains more difficult and slower than crawling which remains their dominant mode of locomotion. Without some intervention they rarely attempt to walk. O'Brien *et al.* designed a training programme of restraint for crawling and priming of walking. The programme was effective for four profoundly retarded children.

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Harris *et al.* (1964) designed a programme to re-establish walking behaviour in a three-year-old girl who had regressed to an excessive amount of crawling. The teachers no longer attended to the child when she was crawling or crouching but gave her continuous warm attention when she was standing, running or walking. Within a week the child acquired a close to normal pattern of walking behaviour. The teachers reversed their attention to crawling behaviour, and the crawling behaviour increased to 80% of the class session. They then reversed behaviour again to re-establish and maintain walking.

The present study is concerned with eliminating crawling, walking in the wrong direction, and walking too slowly. It is, therefore, concerned with establishing an acceptable walking behaviour. This behaviour is walking at a set speed (25 yards in three minutes), and in a particular direction (towards school) with a definite destination (the classroom).

The present study uses social reinforcement, extinction, as described by Becker *et al.* (1971), and a programme of "unsystematic" or spontaneous desensitization, as described by Graziano (1971) who used physical relaxation without formal desensitization sequences.

The following work plan gives an outline of the four phase programme.

The therapists include the physiotherapist and the ward psychologist, the latter being the person to start the patient on his journey each day. If the patient failed to reach the physiotherapist in the time allowed, she left the scene (this constituted extinction). The psychologist then returned the child to the ward and left him, explaining in a matter of fact voice: "Sue has gone because you were too slow. We will try again tomorrow."

SUBJECT CHARACTERISTICS

The subject is a twelve-year-old, moderately retarded, institutionalized boy (Keith).

He was excluded from an OF school because he was a "behavioural problem". For the same reason his parents do not want him at home.

He has slight spasticity in his lower limbs and some ataxia, thought to be caused by a lesion in the cerebellum.

His history suggests a consistent pattern of undesired behaviour being rewarded by gaining attention.

In the report sent from the school giving reasons for his exclusion, his teacher comments: "Reprimand and punishment seem to be a form of gratification rather than a deterrent. We are satisfied that he is a compulsive attention-seeker."

Keith has had periods at home when he falls a great deal and moves around by crawling. During this time his mother sees that he is with her and reports giving him extra attention.

He is in a ward with other boys, some mildly retarded, some moderately retarded, and some autistic. His school class has moderately retarded girls from an adjoining ward, and one other boy from his ward, a rather aggressive autistic boy.

The boys all set out for school together and Keith is left behind unless he is carried on the back of one of the bigger boys or helped by them. If they go ahead, he will resort to crawling to school, taking several rests and taking up to 1½ hours to complete the journey. He was referred for physiotherapy, and the present study sets out the design of the programme which it was decided was the most appropriate form of physiotherapy for Keith, and some conclusions drawn from the result.

The study was carried out on the grassy slope between the ward and the schoolroom, a distance of 100 yards.

SUMMARY OF WORK PROGRAMME

Phase 1. The physiotherapist waits for three minutes at the 25-yard mark. The psychologist tells Keith to begin walking, and signals the physiotherapist to begin timing. If Keith walks steadily to the mark, a hug and verbal praise are given by the physiotherapist, who accompanies him for the remaining distance to his schoolroom. If he fails to achieve the target behaviour, the physiotherapist walks away, leaving Keith with the psychologist who returns him to his ward, as previously described.

The criterion for entry to Phase 1 is the ability to walk unaided for 25 yards.

Phase 2. The physiotherapist waits for six minutes at the 50-yard mark. Procedure as above. Criterion for entry to Phase 2, the ability to walk 25 yards in three minutes for three consecutive days.

Phase 3. The physiotherapist waits for nine minutes at the 75-yard mark. Procedure as above. Criterion for entry, maintenance of Phase 2 target behaviour for three consecutive days.

Phase 4. The physiotherapist waits for 12 minutes at the 100-yard mark. Procedure as above. Criterion for entry, maintenance of Phase 3 target behaviour for three consecutive days.

Phase 5. Keith begins his journey to school with his peers on instructions from the nurse. The physiotherapist waits at the schoolroom to reward him with affectionate praise, twice weekly for three weeks. Following this, the teacher praises him daily for a time, then every second day. Criterion for entry, maintenance of Phase 4 target behaviour for six consecutive days.

DESIGN OF STUDY

"Unsystematic" Desensitization. Keith is placed in a relaxed position, lying on his back with his knees bent and arms above his head. Both his hands are shaken gently and rhythmically while he is given encouragement and praise. A hierarchy is not used. When he is quite relaxed he is rolled on to his stomach and given minimal help to stand. When standing he is given further praise. He is then taken to the starting point where he is met by the psychologist who stands beside him without touching him.

Social Reinforcement. The psychologist walks behind Keith at a distance but close enough to deter other boys who come to help Keith or to help him up if he falls. Her help

will be phased out by fading when each phase is successfully completed. Only the physiotherapist gives praise for successful behaviour.

Extinction. If Keith does not reach the physiotherapist in the set time she leaves the scene. This withdrawal of reinforcement for undesired behaviour is termed extinction.

The programme was carried out daily at 9.30 a.m., which was the usual time for the boys to go to school. The other children would thus be on their way, and distractions for Keith would be at a minimum. The physiotherapist used a stop watch, which was visible in her hand.

Keith was told that the physiotherapist would wait for him for three minutes — long enough for him to reach her if he walked steadily. He was told that if he was too slow, or if he crawled, she would go away, but they would try again the next day.

"Walking" was defined as uninterrupted movement across the ground for at least three seconds, with the soles of the feet in contact with the floor. "Crawling" was uninterrupted movement for at least three seconds with the knees in contact with the floor.

The predictor or independent variable is the treatment programme, which is measured by the number of days it has been in operation. Walking behaviour (measured in time of walking) is the dependent or response variable.

RESULTS

The present study is incomplete, but will continue until, it is hoped, target behaviour is reached.

Baseline data gave a mean of 3.22 minutes for 25 yards over five days. The mean for 100 yards was 9.25. It was decided that three minutes for each 25 yards would be the criterion for moving to the next phase. This was slightly lower than one-quarter of the 100-yard mean, but higher than the 25-yard mean.

The criterion for Phase 2 was reached on day 12 of Phase 1, a Friday. Keith went home for the weekend. On Monday morning he refused to walk without assistance. He was not able to attempt to walk alone, even with the psychologist standing by. It was therefore decided to return to Phase 1, but Keith would not attempt to walk for two more days.

It was discovered that Keith's father had beaten him severely during his stay at home. A great deal of bruising appeared by the end of the week.

Two weeks (ten treatment days) later, criterion for entry to Phase 2 was reached again.

Phase 2 was attempted, but Keith refused to walk after the first few steps. He made gestures and called to the physiotherapist to come closer. He seemed determined to wait for the physiotherapist to take up her usual place. After 6 minutes the physiotherapist left the scene.

The next day Keith appeared to lose interest when the physiotherapist appeared at the 50-yard mark. He ignored her. She left the scene after 6 minutes.

A process of shaping was introduced. The psychologist allowed Keith to hold one finger while he walked to the physiotherapist. He walked the 50 yards in 4 minutes 50 seconds.

A phase called Phase 11(a) was introduced. On the second day the time taken was 5 minutes.

After criterion (3 days of under 6 minutes) is reached Phase 11(b) will be begun and Keith will again be expected to walk alone.

DISCUSSION

The first phase of the training programme resulted in an improvement of walking behaviour over 25 yards. The use of social reinforcement for walking as used by Harris *et al. (op. cit.)* was appropriate for this child.

The second phase did not proceed as planned because of the adverse effect of the father's intervention.

The process of shaping appears, in the initial stages to be successful in bridging the gap between Phase 1 and Phase 11. Keith has reached criterion for two days at the time of writing. It will be shown later whether this process has been useful, if criterion can be reached by Keith alone.

No conclusive evidence on the relaxation aspect of the programme has been obtained. Immediately after the relaxation Keith takes several steadier steps, but a numerical count seems to depend more on the emotional level in the ward rather than on Keith's level of anxiety. Level of anxiety is measured by pulse rate, respiration rate and apparent, that is, subjective state of activity. It is a relatively objective measure made daily by the sister in charge of the ward and has been regarded as sympathetic versus parasympathetic systems dominating activity of the organism.

Recommendations

It would appear from available data that the present programme should be extended until the target is reached.

A shaping phase where Keith is given minimal assistance may be necessary between each phase, after criterion is reached.

It has been recommended that independent walking be reinforced by social praise.

A token economy is in operation on Keith's ward and it has been recommended that he should be given a token accompanied by praise when he walks to the toilet or walks back to the ward or makes efforts to walk independently in the ward.

SUMMARY

Recently, physiotherapists have shown increased interest in the application of learning theory to clinical practice.

An operant conditioning programme has been used to establish walking behaviour.

Some progress has been made and it would appear from available data that the present programme should be extended until the target is reached.

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